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AUTHOR Fairwell, Kay, Ed.; And Others
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ABSTRACT

Designed to allow youngsters aged 10 to 15 to experience the challenges and problems environmental investigators might face making an environmental impact study, the trial version of the Outdoor Biology Instructional Strategies (OBIS) Trail Module focuses on aspects of construction-related environment problems. Four activities are included in the Module: (1) "Trail Impact Study", in which participants plan a safe, convenient footpath that will have minimal impact on the site; (2) "Cardiac Hill", in which participants use pulse rates as a guide to finding the maximum steepness for a trail along which hikers can walk comfortably; (3) "Hold a Hill", an activity to determine how steep a trail can be before excessive erosion occurs; and (4) "Trail Construction", finding the best construction technique for the site. The individual, water-proof folio for each activity includes activity explanation, preparation, materials, action, discussion, and follow-up. Other materials are an overview of the Module and OBIS, and an equipment card indicating how to mak inexpensive metric materials for measuring slope. (SB)

THE OBIS TRAIL MODULE

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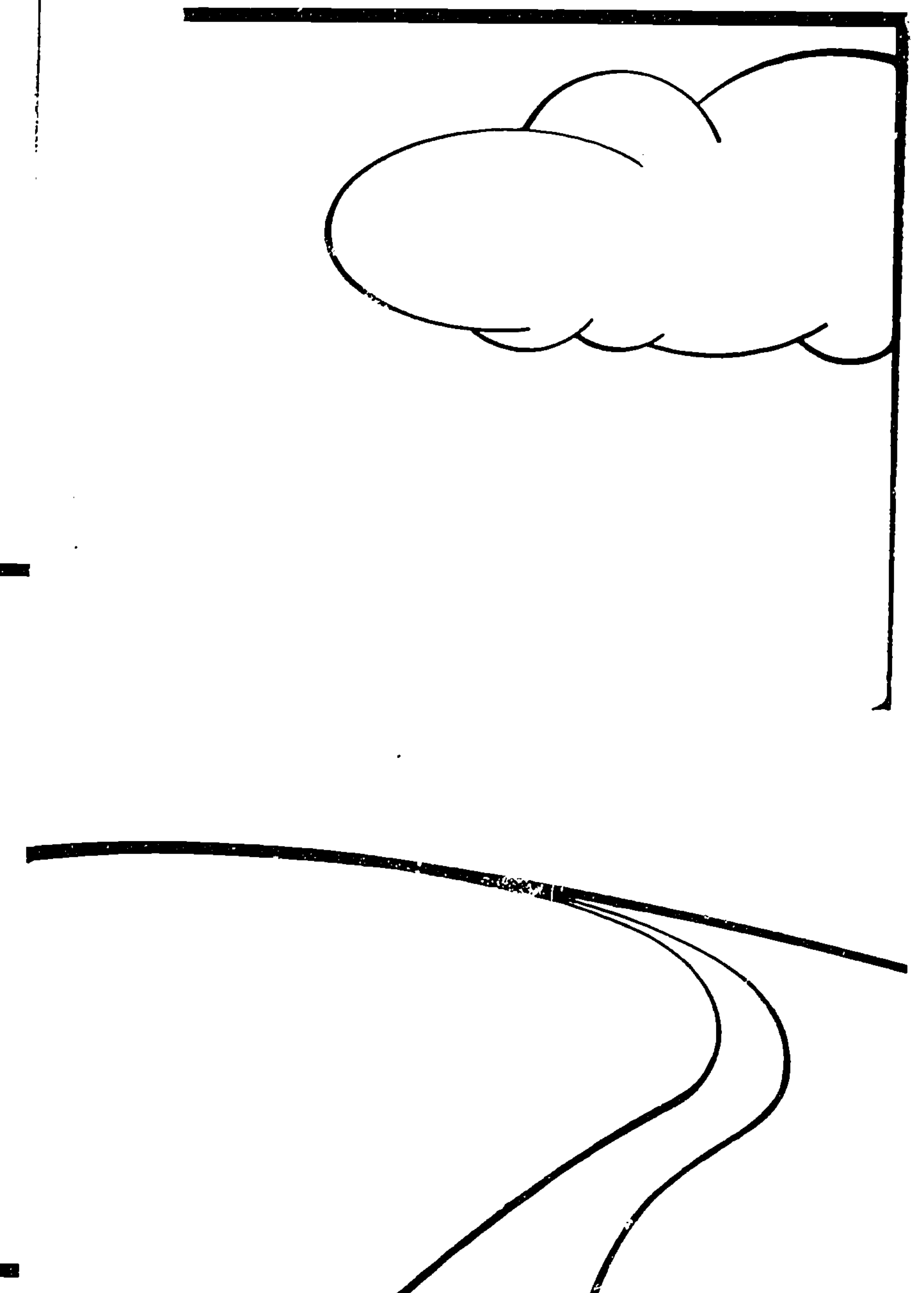
TRIAL VERSION



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OBIS ABSTRACT

What is OBIS?

Start with a group of young people in the out-of-doors and a biological concept or process as the basic ingredients. Add a large measure of fun; stir in the discovery approach; and season with a simulation, a game, a craft, or an interesting investigation. Mix thoroughly and you have one of the 100 activities that have been developed by the Outdoor Biology Instructional Strategies (OBIS) Project.

OBIS provides community-sponsored youth organizations and schools with learning activities for use at common outdoor sites such as lawns, local parks, city lots, neighborhood streams and ponds, and the seashore. Although the activities are intended primarily for ten- to fifteen-year-old youngsters, both younger and older people (including family groups) have enjoyed OBIS activites. Their easy-to-follow format, simple preparation and equipment, and short duration (usually one hour) make OBIS activities suitable for both the experienced outdoor-education leader and the first timer with no previous experience in biology. The activities may be used independently or sequenced to create a program to suit your needs. Scouts, Park and Recreation districts, religious groups, service groups, nature centers, summer camps, and schools are a few of the groups that have used OBIS activites in their outdoor-education programs. OBIS activities help youngsters and adults to better understand and appreciate the ecological relationships in their local environment.

How Were OBIS Activities Developed and Trial Tested?

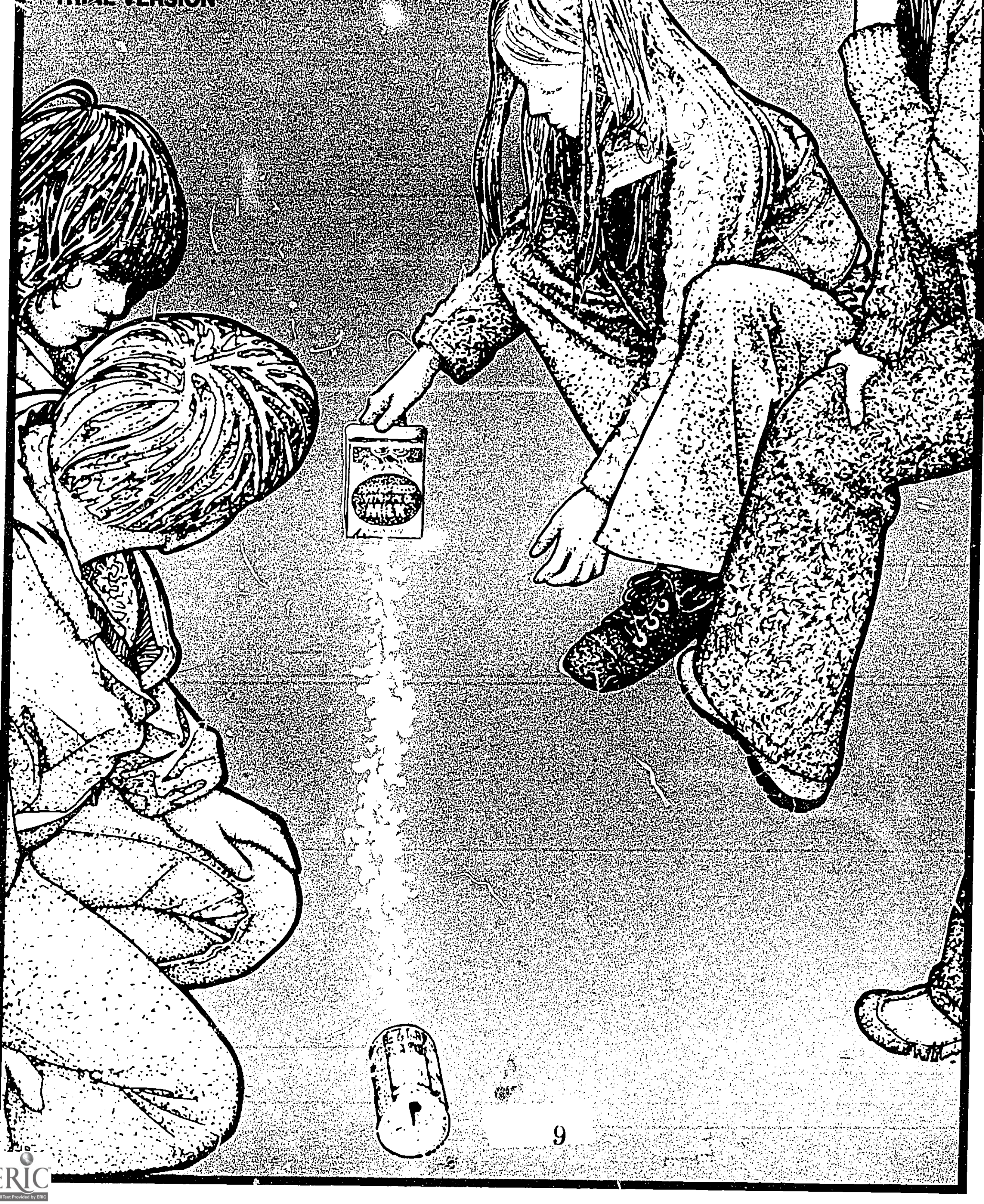
The OBIS materials were developed at the Lawrence Hall of Science, University of California, Berkeley, and supported by a grant from the National Science Foundation. The materials were developed over a six-year period ending in 1978. Unlike many development projects, OBIS considered the testing of activities with youngsters to be an integral part of the development process. The OBIS activity development procedure is one of devising a strategy, trying it out numerous times with youngsters, making modifications and then retrying the revised activity. This testing, revision, and retesting process was repeated on a local level and, in many cases, on a national level for each OBIS activity. To help gather national feedback on the trial edition activities, OBIS established a network of OBIS Resource Centers across the country. Over the past five years, OBIS has received thousands of feedback comments from OBIS users throughout the United States. This feedback is being used to revise the existing OBIS trial editions.

The OBIS Trial Editions are available through the Lawrence Hall of Science, University of California, Berkeley, California 94720.


TION

HOLD A HILL

TRIAL VERSION



EROSION

Soil erosion is the wearing away of the soil by wind or water. *Hold a Hill* focuses on the rate of soil erosion caused by water, and on the environmental consequences of erosion. Many factors govern the rate at which erosion occurs: the slope of the land, the plant cover, kind of soil, amount of water flowing, and length of time the water flows. The most serious soil erosion occurs when natural forces or human activities disrupt the natural plant cover. Fires, floods, and slides destroy plant cover, and leave the bare soil exposed to water. Human activities such as construction and agriculture also alter the environment and may either decrease or increase the rate of soil erosion. The possibility of erosion and its effect on plants and animals is often overlooked.

FIND OUT HOW STEEP YOU CAN MAKE A TRAIL AND STILL PREVENT EXCESSIVE EROSION.

SETTING THE STAGE

Set the stage for *Hold a Hill* by presenting the activity in a hypothetical context. Cast your group in the role of a soil-conservation team designing a trail for your area. The specific task is to determine the maximum slope of a trail that will not result in serious soil erosion. Slope of the land is the most critical factor to investigate during the experiments, but the type of soil and soil cover will also be covered in the discussions and follow-through activities. As most trails consist of bare soil, the experiments will be more meaningful if you can find some bare soil or scrape away a little soil cover where you plan to do the experiments.

MATERIALS

For the group:

1 data board and marking pen
1 or 2 large containers of water, a water tap, or other water supply (Each team will need 6 to 8 liters of water.)
2 slope-measuring devices*

For each team of two:

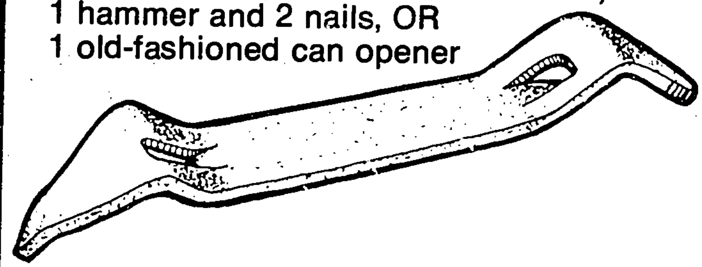
1 **one-liter water source** (see PREPARATION)
1 **tin-can erosion collector** (see PREPARATION)
1 meter tape
1 trowel or small digging tool
2-4 plastic bags or cups
• masking tape (for labels on bags or cups)

Materials to build a one-liter water source:

1 half-gallon milk carton
1 short pencil (to poke hole)
1 pair of scissors
1 meter tape

Materials to build a tin-can erosion collector:

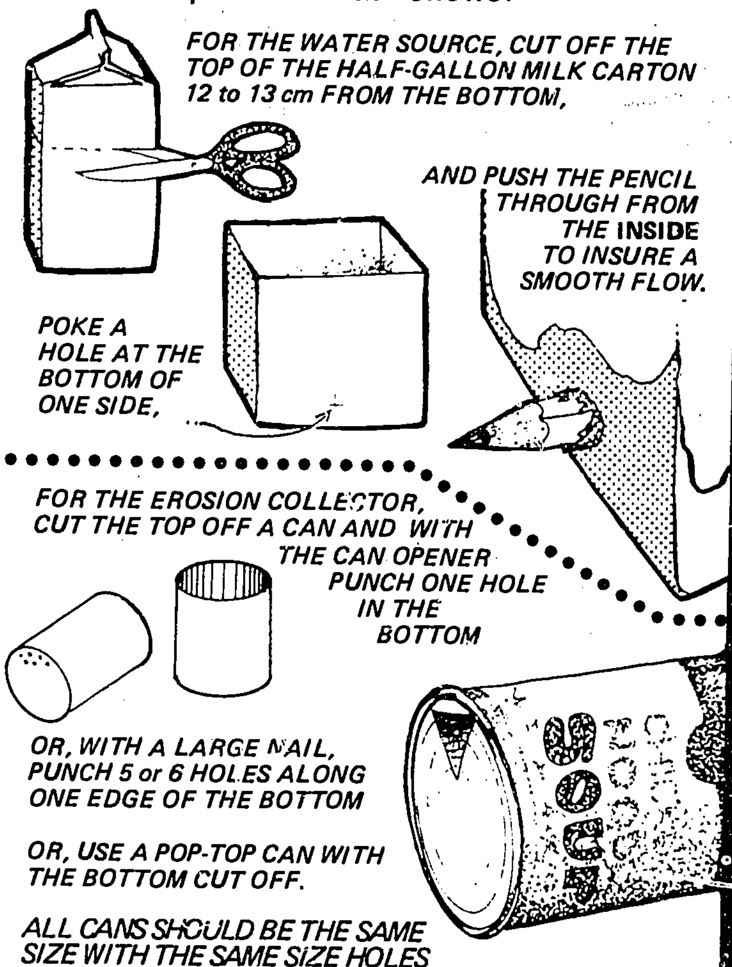
1 tin can (soft drink, dog food, etc.)
1 can opener (to remove can bottom)
1 hammer and 2 nails, OR
1 old-fashioned can opener



*See the "Measuring Slope" equipment card.

PREPARATION

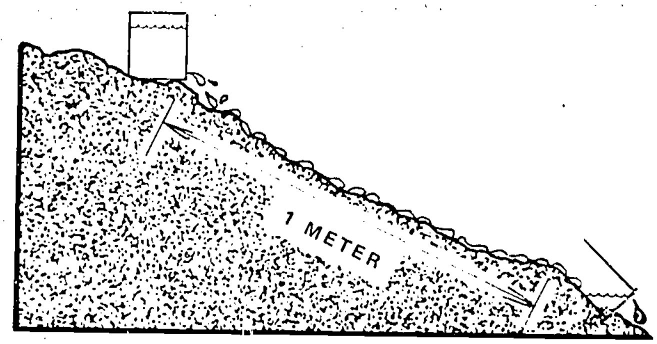
You will need a couple of slope devices. Read the equipment card for instructions. You will also need a **one-liter water source** and a **tin-can erosion collector** for each team. Prepare them as follows:



ACTION: LET IT FLOW!

1. Move to your hillside, preferably one with a variety of slopes. Introduce the challenge in the hypothetical context of the soil-conservation team.
2. If the youngsters are going to construct their own equipment, distribute materials and start the construction.
3. **Demonstrate erosion collection.**

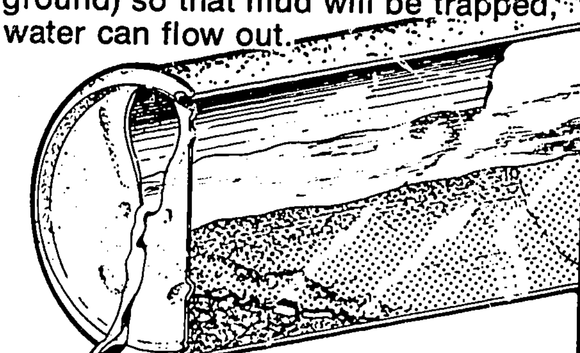
a. Select a slope and measure off one meter as your experimental section. Now measure the slope of this section. Place your water source at the top of the section, and the collection can at the bottom.



b. Scratch a *shallow* trench from the water source to the can to direct the flow. Remove any loose debris.

c. Fill your water source from the water supply. Place your finger over the flow hole and carry the source into position. Let the water flow.

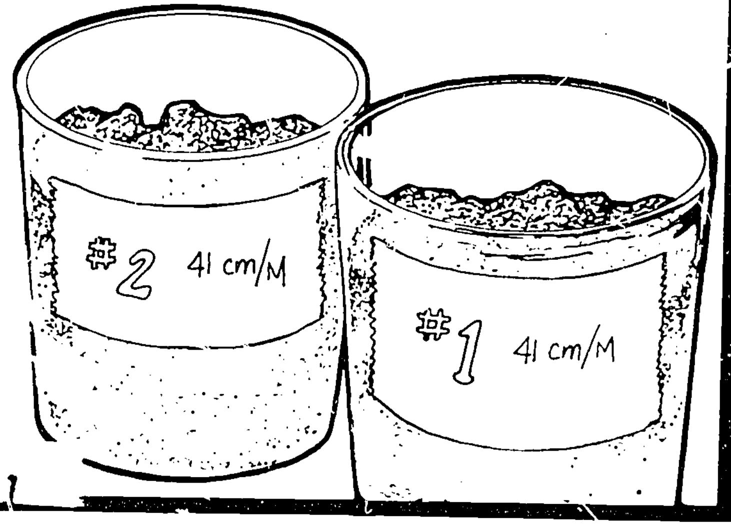
d. All the runoff should go through the can. Be sure the hole is *up* (away from the ground) so that mud will be trapped, but water can flow out.



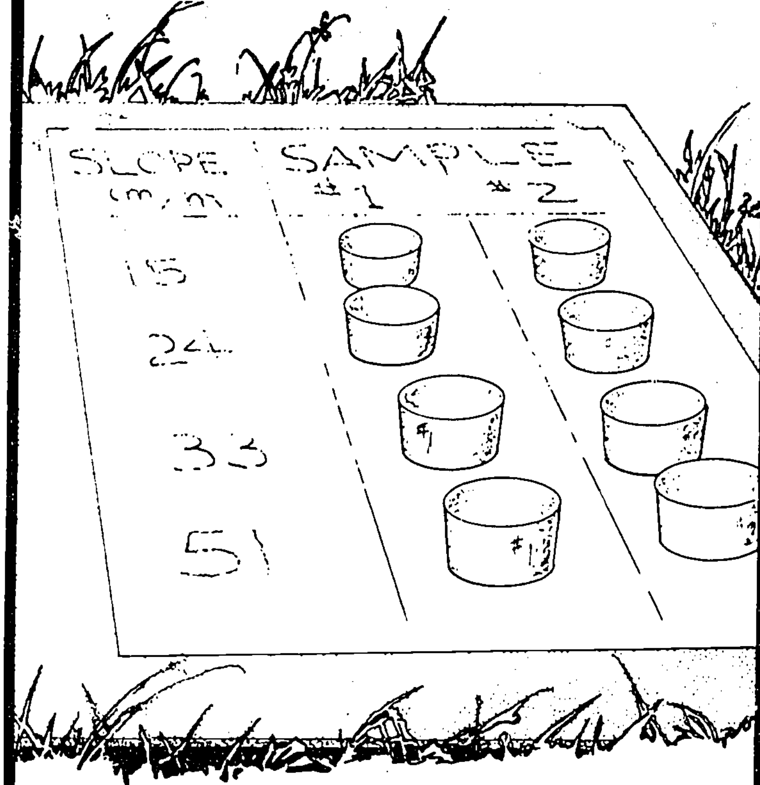
e. When the flow has stopped, carefully tip the last bit of water out. Shake the mud into a plastic cup or plastic bag.

f. Label the experimental result with the number of the trial and the slope of the land.

4. **Form teams of two.** Instruct the teams to take two samples from each slope they investigate, and to label the samples #1 and #2. Go!



5. **Organize the results.** Display the results on a data board or other flat surface. Start with the gentlest slope and proceed to the steepest slope.



6. **Judging erosion.** This part of the activity calls for a value judgment. How much erosion is acceptable? No soil in the cup is certainly acceptable, and a full cup is certainly unacceptable, but how much is too much? It is up to your group to determine the maximum slope of a trail that will not create serious erosion problems.

Save your data for *Trail Construction.*

RUN IT BY AGAIN — FOLLOW THROUGH

☐ What is the effect of plant cover (dead or alive) on the rate of soil erosion? Compare two similar slopes: one with vegetation cover and one without.

☐ What is the effect of erosion on organisms? Run water around some plants. Do they wash away? Does the water expose the roots? Are plants and animals buried in mud?

☐ Modify the slope to reduce erosion. Do piles of rock, gravel, or sand across the flow stabilize the slope? Experiment and find out.

☐ What is the effect of long-term flow? Set up an experimental slope and collect 10 to 20 samples. Does erosion increase or decrease with each additional sample?

☐ Visit some areas where human activities have bared the soil to potential erosion (construction sites, agricultural areas, road cuts, etc.). Is soil erosion in process? What measures, if any, have been taken to guard against erosion?

WHAT TO DO NEXT

Cardiac Hill
Trail Construction

Outdoor Biology
Instructional Strategies
Lawrence Hall of Science
University of California
Berkeley, California

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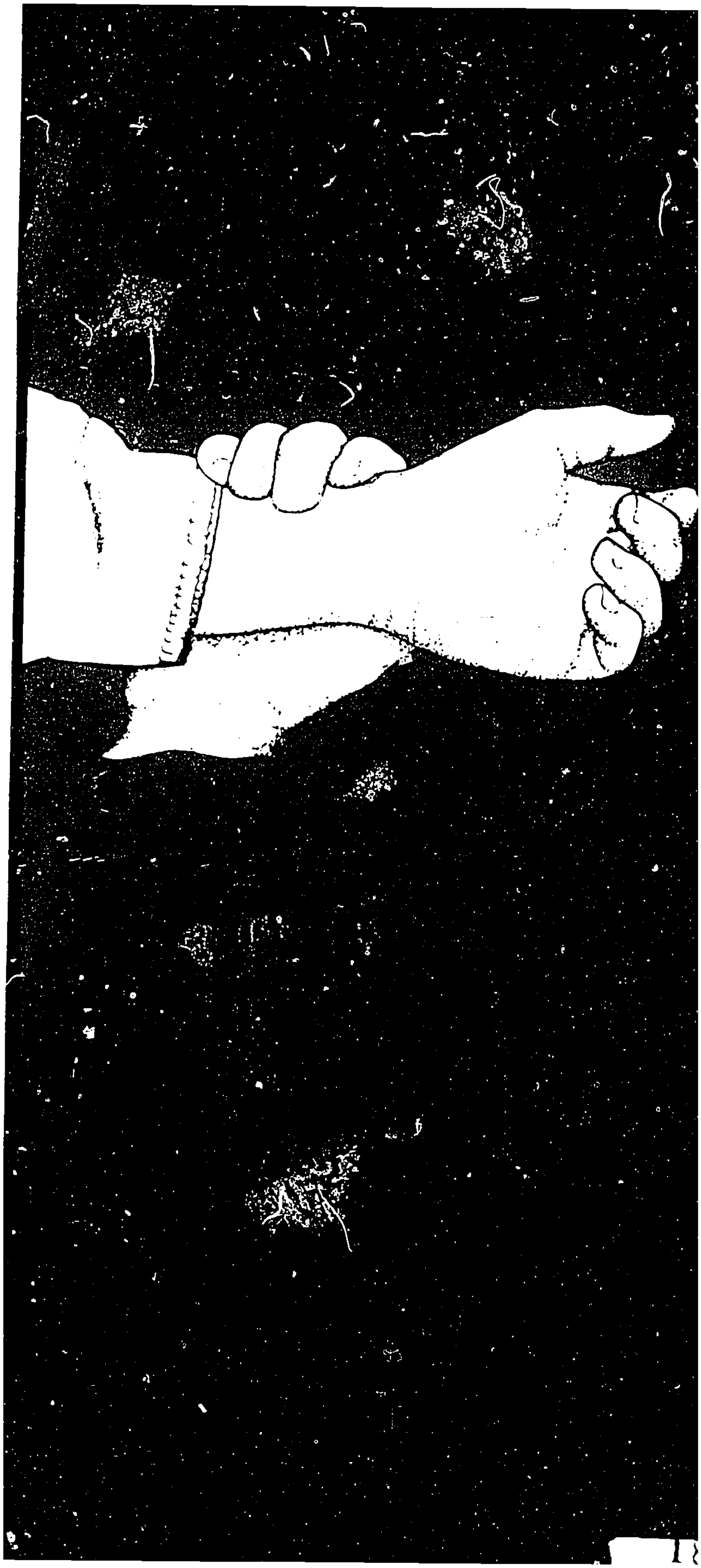
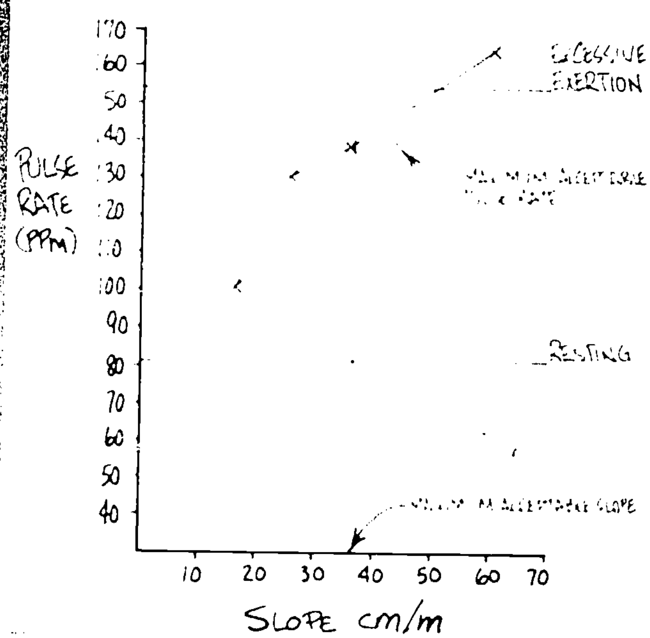
TRAIL CONDITIONS
TRAFFIC: 50 PEOPLE PER DAY MAXIMUM
SLOPE: 40 cm/m MAXIMUM (EROSION THRESHOLD)
SPECIES DANGEROUS TO MAN:
POISON OAK
AVOID!
ENDANGERED SPECIES:
MILLIPEDES
DO NOT DISTURB!


CARDIAC HILL



that exertion.



MAXIMUM TRAIL SLOPE WAS DETERMINED TO BE 35 cm/m

Save your data to use in *Trail Construction*.


E OBIS TRAIL MODULE
TRIAL VERSION

WHAT IS OBIS?

Outdoor Biology Instructional Strategies offers both independent and sequential activities to promote the understanding of ecological relationships by youngsters from ten to fifteen years of age. The major goal of OBIS is to design instructional strategies for experiences in outdoor biology that can be applied in diverse environments.

OBIS activities are primarily oriented toward community-sponsored youth organizations and nature centers. The activities introduce basic concepts of ecology in interest-catching ways. Youngsters investigate the interrelationships of plants, animals, and the physical environment. These interrelationships include humanity's role in the natural scheme. Such firsthand experience forms the basis for the understanding of basic biological relationships. This understanding is necessary to develop the public consciousness required to support appropriate management of the environment.

THE OBIS TRAIL MODULE

For thousands of years, people manipulated their environment to suit their needs and desires. During this period, the earth seemed enormous and its resources inexhaustible. Those times have passed, however. Laws now require knowledgeable investigators to study proposed uses of the environment before actions are taken. Such studies are called **environmental impact studies.**

The purpose of an environmental impact study is to assess environmental changes likely to occur as a result of people's actions and suggest ways of keeping negative changes to a minimum. Large projects must conduct public hearings so that citizens may express their opinions about the impact that proposed actions will have in their community.

The OBIS Trail Module is designed to allow youngsters to experience the challenges and problems environmental investigators might face while making such a study. The four trail activities focus on several aspects of construction-related environmental problems. OBIS suggests two ways to organize this module.

1. You may want to start your investigations with an overview of impact problems by using the simulation *Trail Impact Study.* The youngsters would then move on to *Cardiac Hill* (safety and comfort for trail users) and *Hold a Hill* (soil erosion problems). Finally, the youngsters would apply their newly acquired knowledge by constructing experimental sections of a trail in *Trail Construction.*

2. Or, if you would rather start with specific environmental investigations and use this information to enrich the generalized activity *Trail Impact Study,* you might start with *Cardic Hill* and/or *Hold a Hill,* follow with *Trail Impact Study,* and conclude with *Trail Construction.* Each plan has its own merit; the choice is yours.

OTHER CURRENTLY AVAILABLE OBIS FOLIOS

The activities listed below appear in the **OBIS Trial Edition Set I** and **Set II** packets, which are available from the Lawrence Hall of Science.

OBIS TRIAL EDITION SET I

Adaptation–Predator-Prey
Animal Movement in Water
Animals in a Grassland
Attention!
Bean Bugs
Great Streamboat Race
Habitat Sun Prints
Habitats of the Pond

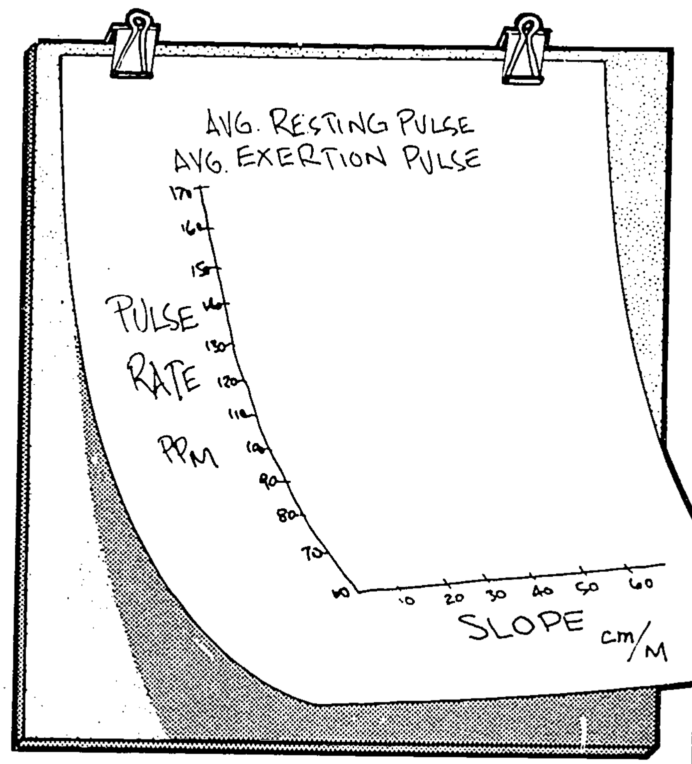
How Many Organisms Live Here?
Invent a Plant
Invent an Animal
Mapping a Study Site
Moisture Makers
Natural Recycling in Soil
Natural Recycling in Water
Out of Control
Plant Hunt
Plants Around a Building
Seed Dispersal
Sticklers
Terrestrial Hi-Lo Hunt
Water Holes to Mini-Ponds
What Lives Here?
Who Goes There?

OBIS TRIAL EDITION SET II

A Better Fly Trap
Animal Anti-Freeze
Animal Diversity
Attract a Fish
Beach Zonation
Birdfeeder
Crawdad Grab
Flocking to Food
Food Chain Game
Gaming in the Outdoors
Hopper Circus
Lichen Looking
Litter Critters
Metric Capers
OBIS Oil Spill
Plant Patterns
Rock Pioneers
Roots and Shoots
Seas in Motion
Sensory Hi-Lo Hunt
Sound Off!
The Old White Sheet Trick
Too Many Mosquitoes
Water Breathers

DATA BOARD

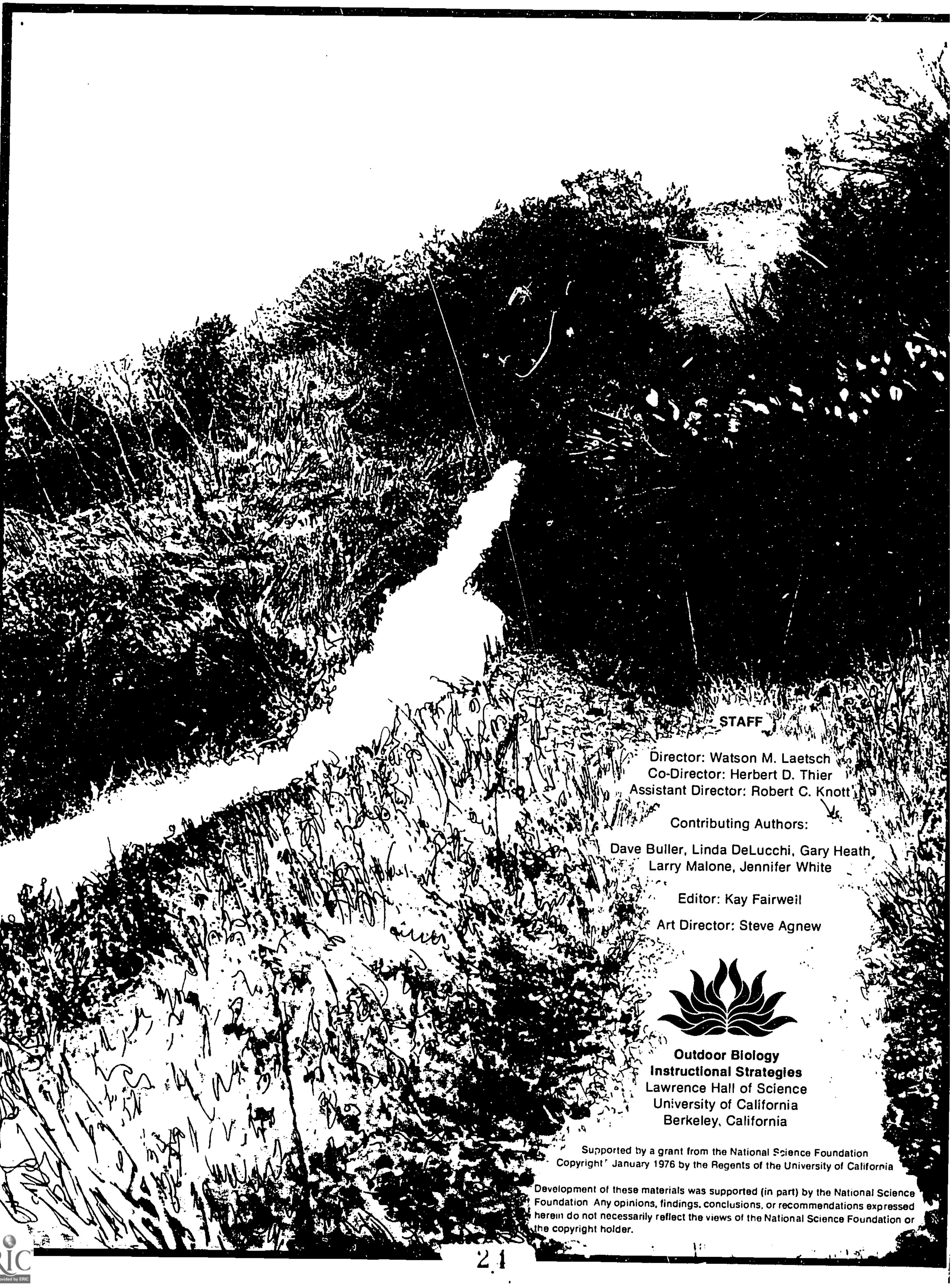
Some of the activities in this module call for the use of a data board. This board serves as a portable blackboard, record board, map, and all-purpose data organizer. Because your participants probably will not have a desk or locker for storage of records from one investigation to the next, a data board allows you to maintain a continuing record. The data board relieves youngsters of the burden of pencils and notebooks. Important terms can be easily viewed by all group members, and field data are conveniently displayed in one place for group consideration.



MAKING A DATA BOARD*

1. You will need a piece of thick cardboard, masonite, or fiberboard for a data board. A good size is 80 cm x 60 cm.
2. Attach paper sheets (butcher or other) to the board.
3. Crayons or felt-tip markers are good for recording data because they leave broad marks and come in a variety of colors, allowing for easy color coding.

*As an alternative, you can use a large sketch pad or small blackboard.



STAFF

Director: Watson M. Laetsch
Co-Director: Herbert D. Thier
Assistant Director: Robert C. Knott

Contributing Authors:

Dave Buller, Linda DeLucchi, Gary Heath, Larry Malone, Jennifer White

Editor: Kay Fairwell

Art Director: Steve Agnew

Outdoor Biology Instructional Strategies
Lawrence Hall of Science
University of California
Berkeley, California

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Equipment Card

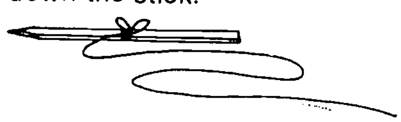
Measuring Slope

MATERIALS FOR SLOPE-MEASURING DEVICE

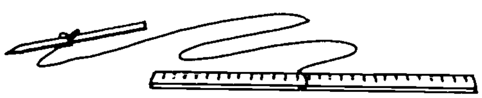
1 meter stick
1 125 cm. piece of strong cord
1 25 cm. sharpened stick
1 level tube (test tube and cork)*
  household ammonia
  water
  tape

Slope can be determined by fixing an anchor point at the upper part of the slope, drawing the one meter cord taut, sliding it up or down until the cord is level, and reading slope directly in cm/meter. Assemble the apparatus like this:

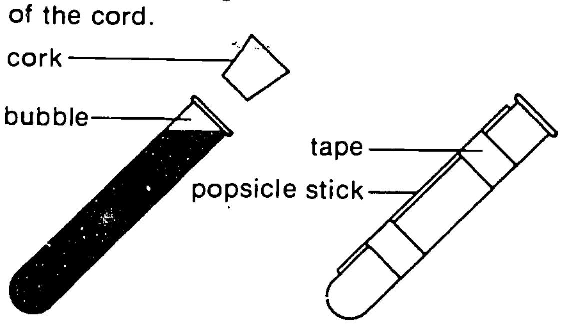
1. Sharpen the 25 cm. stick and fasten the cord to it with a knot which can slide up and down the stick.



2. Attach the free end of the cord to the meter stick so that the distance between the two sticks is one meter, and the cord can slide on the meter stick. You can mark off centimeters on any stick if you do not have a meter stick.

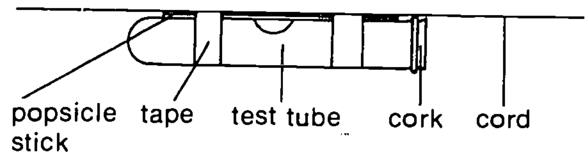


3. Make your level. Fill the test tube almost full of water and add a drop of ammonia. Cork the tube so that a small bubble remains. Trim off top of cork. If your test tube has a flared lip at the top, tape a popsicle stick to the side of the tube before taping the level tube to the center of the cord.



*A little bubble called a line level is available at hardware stores or may be purchased from the Lawrence Hall of Science.

Your level should look like this:



4. Assemble all pieces and use like this: